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MRSA Surveillance in Washington State

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Staphylococcus aureus can cause mild infections or more severe invasive disease that in the past could be treated with penicillin-related antibiotics. Methicillin-resistant *S. aureus* (MRSA) was first reported in a hospital outbreak in the United States by 1968 and within a community of injection drug users in the early 1980s. Over the last several years, MRSA has become a concern in both healthcare and community settings. Approximately 80% of MRSA infections involve the skin or soft tissues and can be treated in an outpatient setting. More severe MRSA infections, including bloodstream infections and necrotizing pneumonia, require hospitalization and may be life-threatening.

Surveillance for MRSA

Region 5 (Pierce County) and Region 7 (comprised of Chelan, Douglas, Grant, Kittitas, and Okanogan counties) have maintained voluntary MRSA surveillance in both inpatient and outpatient facilities since 2000 and 2003, respectively.

Pierce County has an estimated 2007 population of 790,500 or approximately 12% of the state's residents. In 2000, Tacoma-Pierce County Health Department established its Antibiotic Resistance Program with one program goal to track antibiotic resistance patterns.

Region 7 in North Central Washington has an estimated 2007 population of approximately 268,000. In 2003, a voluntary MRSA surveillance program was established to reduce MRSA transmission by determining the affected population, tracking changes in antimicrobial resistance, and educating healthcare providers and patients about appropriate antibiotic use.

Surveillance Methods

Reports were included for culture dates between January 2003 and December 2006. In Region 5, MRSA cases are reported voluntarily by all seven hospitals (both inpatient and emergency room [ER]), 12-16 long-term care facilities, 9-14 outpatient clinics, and one commercial laboratory.

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In Region 7, MRSA-positive laboratory results are reported by 11 of 12 hospitals, three clinics, and two commercial laboratories, facilities which account for the majority of healthcare providers in the region. In each region, communicable disease or epidemiology staff assigns a case to a body site category based on the laboratory or provider report. Most reports did not include additional diagnostic information. In this analysis, sites were categorized as listed in Table 1. If the site reported was unclear then available diagnoses were reviewed for additional information.

Table 1. Infection Site Categories

Site	Description
Sterile fluids	Blood, bone & joint, CSF, or mention of septic
Skin and soft tissue infection (SSTI)	Wounds, abscess, or skin infection of any location, e.g., nose, buttocks, neck, hip, abdomen, foot, stomach, or abdomen
Urinary	Urine or urinary
Respiratory	Tracheal aspirates, bronchial wash, endotracheal (ET), ET aspirates, pleural fluid, etc.
Sputum/ nasopharyngeal	Sputum and nasopharyngeal only; excludes nares or nasal swab
Surgical	Any mention of surgery, PEG tubes, catheter site, exit site, etc.
Other	Eye, mid ear, nasal aspirate, throat, tonsil, stool, urogenital, etc.
Unknown	Site not stated on report

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The total number of positive MRSA reports per year in each region was stratified by facility type (inpatient, emergency room, outpatient, and other) and by body site. The first report per person per year was counted. Since both regions rely on voluntary reporting systems and do not include all healthcare facilities, the numbers of cases per year reported here are not true incidence rates and underestimate the actual number of cases diagnosed in the communities. Antibiotic susceptibility patterns were assessed by calculating annual percentages.

Surveillance Results

During the 4-year study period, the number of new cases reported has increased in both Regions 5 and 7 (Table 2). The data are not collected the same way in the regions, so rates cannot be compared between regions but can be compared over time within a region. The region-specific trends show that the respective regional rates have increased every year and in both nearly tripled from 2003 to 2006.

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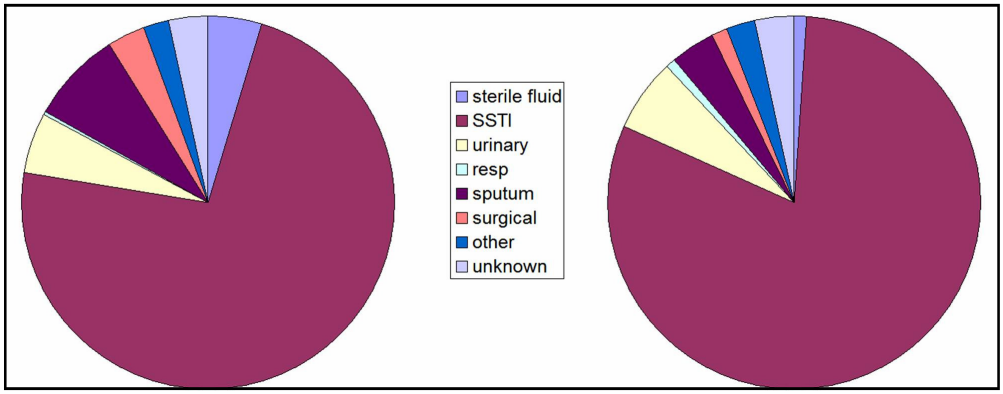
Table 2. Positive MRSA Cultures per Year by Region

Region 5				Region 7			
Year	Total Reports	New Cases*	Rate* per 10,000	Year	Total Reports	New Cases*	Rate* per 10,000
2003	1542	1224	16.7	2003	234	205	8.1
2004	2279	1896	25.5	2004	470	422	16.5
2005	3641	3067	40.6	2005	512	458	17.7
2006	4305	3641	47.1	2006	881	694	26.3

* New cases were defined as the first report per person per year. Rates are based on new cases.

The majority of reported infections in both regions are skin and soft tissue infections (Figure 1).

Figure 1. Positive MRSA Reports by Infection Site and Region, 2003-2006



Rates by age group differ slightly by region. In Region 5 (Figure 2a), rates are highest among the >70 year old group. The 40-49 year old group has second highest rate of new cases during the past 2 years. The age group with the fastest growing incidence is 0-4 year olds. In Region 7 (Figure 2b), rates are also highest within the >70 year old group, but the rates for this group are substantially greater than the other age groups only in 2006. In contrast to Region 5, this age group sustained the largest rate increase. Also unlike Region 5, the 30-39 year old group in Region 7 had the highest rates in 2005.

Figure 2. Rates of MRSA Cases* by Age Group and Year

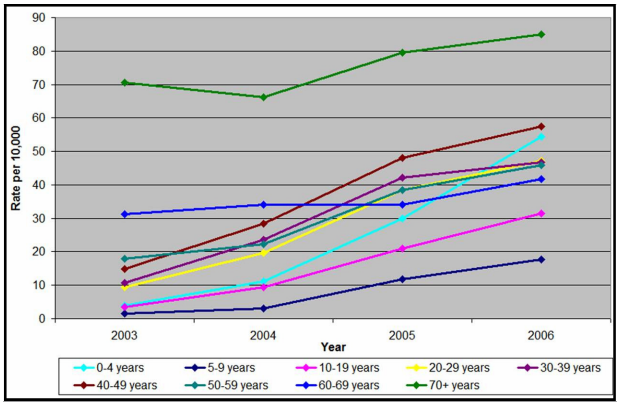


Figure 2a. Region 5

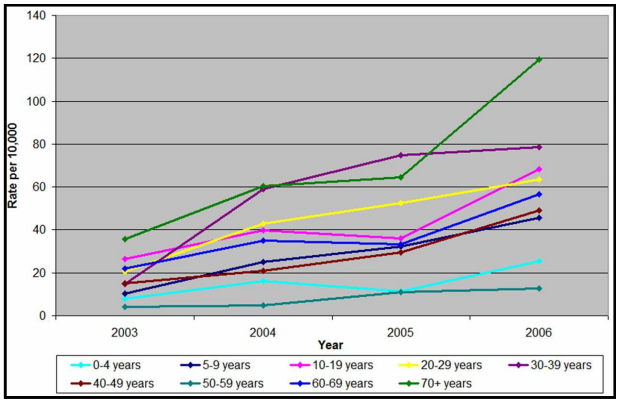


Figure 2b. Region 7

* New cases were defined as the first report per person per year. Rates are based on new cases.

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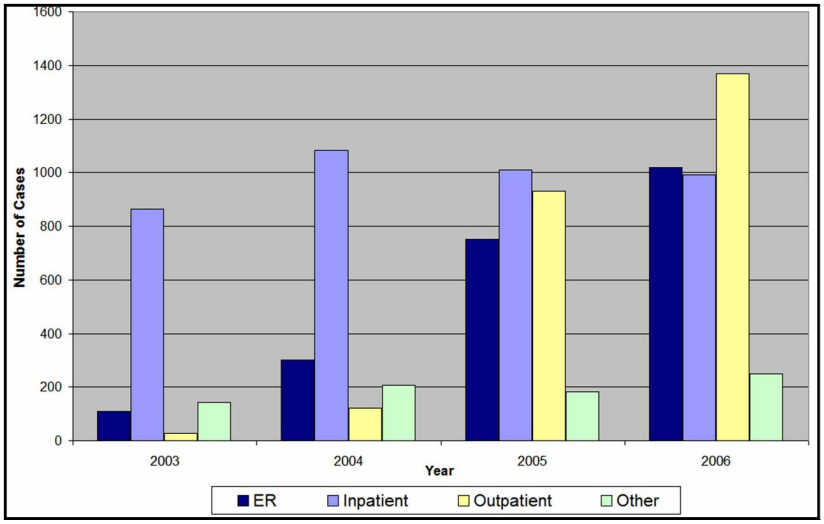
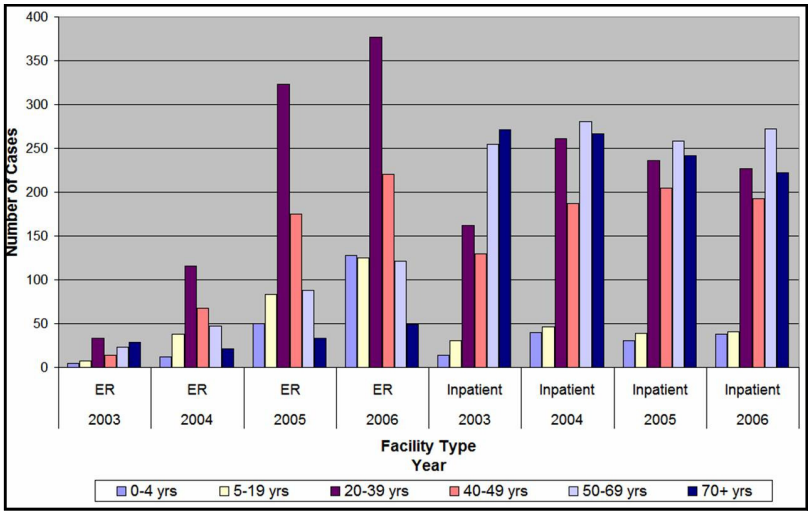
In Region 5, there has been a substantial increase in the number of visits to outpatient and ER facilities, whereas the number visits to inpatient care facilities remained relatively stable (Figure 3). Facility type was not consistently collected in the Region 7 database. However, review of data collected during 2004 and 2005 shows the majority (>60%) were reported from outpatient facilities. When the facility type and age group trends were reviewed together, the inpatient cases tended to decrease across all age groups over the period (Figure 4); whereas visits to ER facilities increased across most age groups. The largest number of visits in inpatient facilities were among patients 70 years or older, but even this age group has declined over the past 4 years. A moderate increase of inpatient visits among 40-49 occurred between 2003 and 2005, but decreased during 2006.

Figure 3. New MRSA Cases* Reported by Facility Type, Region 5



* New cases were defined as the first report per person per year.

Figure 4. New MRSA Cases* by Facility Type and Age Group, Region 5



* New cases were defined as the first report per person per year.

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Antibiotic susceptibility patterns appear very similar, as shown in Figure 5. In both regions only about 10% of isolates are susceptible to erythromycin; roughly 30% are susceptible to ciprofloxacin; and 60-70% are susceptible to clindamycin. In Region 5, susceptibility to clindamycin appears to have increased nearly 10% during both 2003-04 and 2004-05. This may reflect an increase in reported numbers of persons under 29 years with MRSA infections, since in Region 5, this age group shows greater susceptibility to clindamycin than older age groups. Most of the other susceptibilities have remained relatively stable across the 4-year study period.

Figure 5. MRSA Antibiotic Susceptibility Patterns per Year

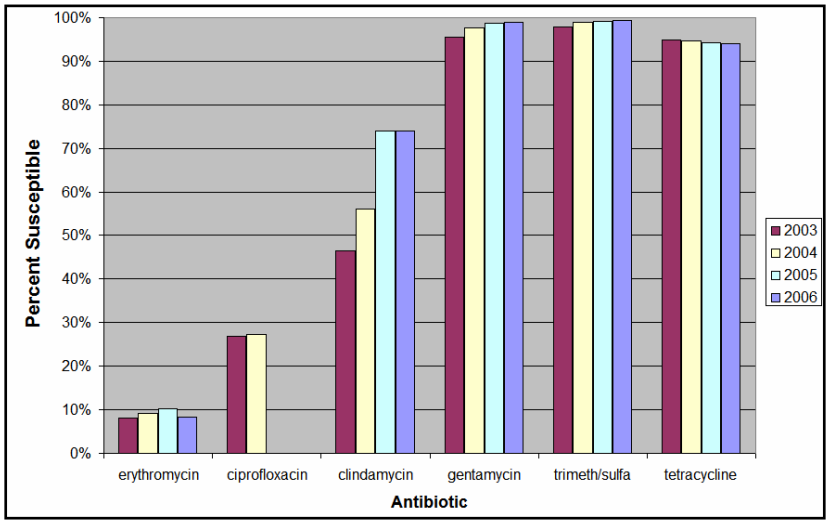

Figure 5a. Region 5

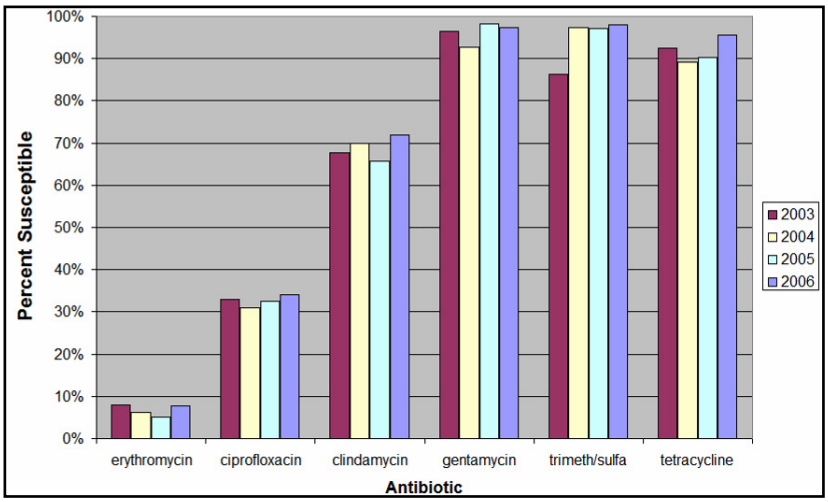

Figure 5b. Region 7

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Discussion

Invasive infections are reported primarily from hospitals and these rates have remained relatively stable, perhaps even declining, during the past four years. The increases of MRSA in two separate regions of the state are primarily due to skin and soft tissue infections that are largely being treated at outpatient and ER facilities, and are likely community-acquired. These findings are consistent with national studies showing an increase in community-acquired MRSA infections. Surveillance across many healthcare facilities, not just hospitals, is needed to monitor community-acquired infections.

Susceptibility patterns appear to be relatively stable for each antibiotic during the 4-year period reviewed in this analysis.

There were several limitations to this analysis. First, both regions have voluntary reporting systems which do not detect all MRSA cases diagnosed within the regions by culture; also only cases that are cultured will be detected. Second, the data are collected differently in the two regions studied, making it difficult to make comparisons. Third, exposure and gender data were not available. Fourth, more information from the reporter, such as invasive versus non-invasive and a clear designation of infection site, would simplify interpretation of surveillance data. Finally, different antibiotics are tested in each region, which limits the number of comparisons that can be made.

Acknowledgements

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